

HDR

# **NUECES BBASC STUDY #1**

## **RE-EXAMINATION OF THE 2001 AGREED ORDER MONTHLY TARGETS AND SAFE YIELD VERSUS CURRENT DEMAND EVALUATIONS**

**NEAC – FEBRUARY 23, 2015  
CORY SHOCKLEY**

# DISCUSSION

01 Background

02 Status

03 Results

04 Schedule

# BACKGROUND

- Nueces BBASC work plan
- TWDB Nueces BBASC Study #1
  - Nueces BBASC Report (Sec. 2.3)
    - Opportunities to better manage fresh water inflows (FWI)... since the 1995 development of the Agreed Order
  - Nueces BBEST
    - Seasonal shift in inflows
      - » Similar to BBEST Report Sec. 4.1
      - » Inflows into Nueces Bay
      - » Operations of Choke Canyon Reservoir / Lake Corpus Christi System



# GOALS

- Determine if a “shift” has occurred in the inflows to the Bay and CCR/LCC System and what impact this “shift” may have on Safe Yield and FWI to the Bay.
- Compare the results from a Safe Yield Demand of 205,000 acft/yr to a current demand of 133,000 acft/yr on FWI to the Bay.



# TASK 1 – SEASONAL SHIFT

- Task ongoing
- Compile, Analyze and Evaluate
  - Compile Hydrologic Data
    - Streamflows, Inflows & Precipitation
    - Long-term (1934 – 2014)
    - Short-term (1986 – 2014)
    - Recent (2004 – 2014)
  - Analyze Data
    - Is there a shift?
    - Compared to 2001 Agreed Order
  - Evaluate New Pattern
    - CCWSM Simulations
    - Same Volumes – Different Distribution
    - Yields & FWI to Bay
    - TXBLEND (if requested)



# SEASONAL SHIFT - METHODOLOGY

- Historical hydrology
  - Precipitation
    - Multiple sites – similar trends
    - 1895 - 2014
  - Natural Inflows
    - Three sites from NUBAY model
    - 1934 - 2003
  - Gaged Streamflow
    - Multiple sites
    - Range of dates

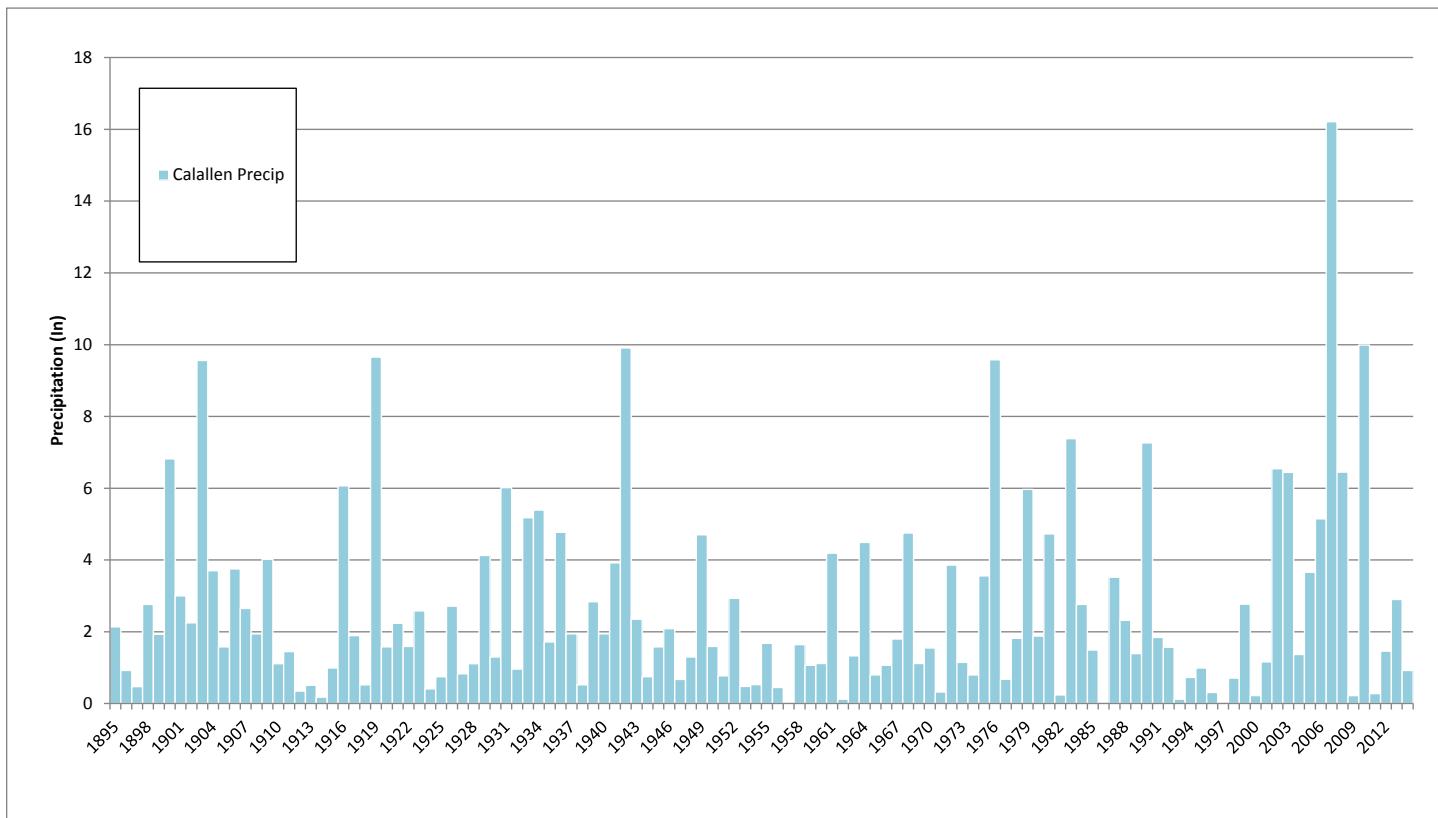


# **SEASONAL SHIFT - QUESTIONS**

- Is the monthly pattern of occurrence different now compared to what is in the Agreed Order?
- Are there distinctive trends that indicate that inflows may occur in different months than those high target months in the Agreed Order?
- Statistical Analysis
  - Compare monthly values
  - 3 time periods
    - Long Term – 1934 – 2014
    - Short term – 1986 – 2014
    - Recent – 2004 - 2014

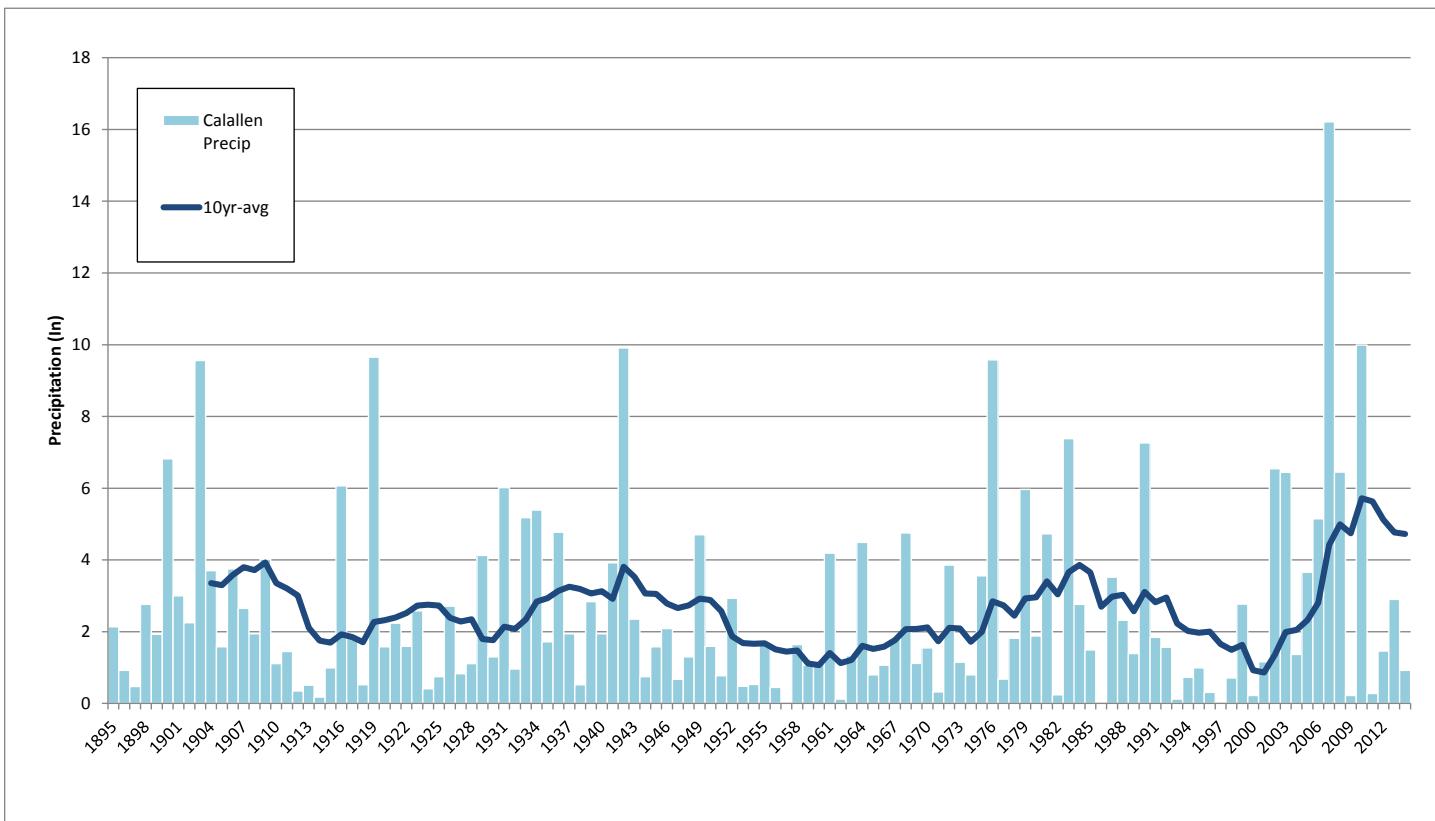
# PRECIPITATION

- July Precip Totals
- 1895 - 2014



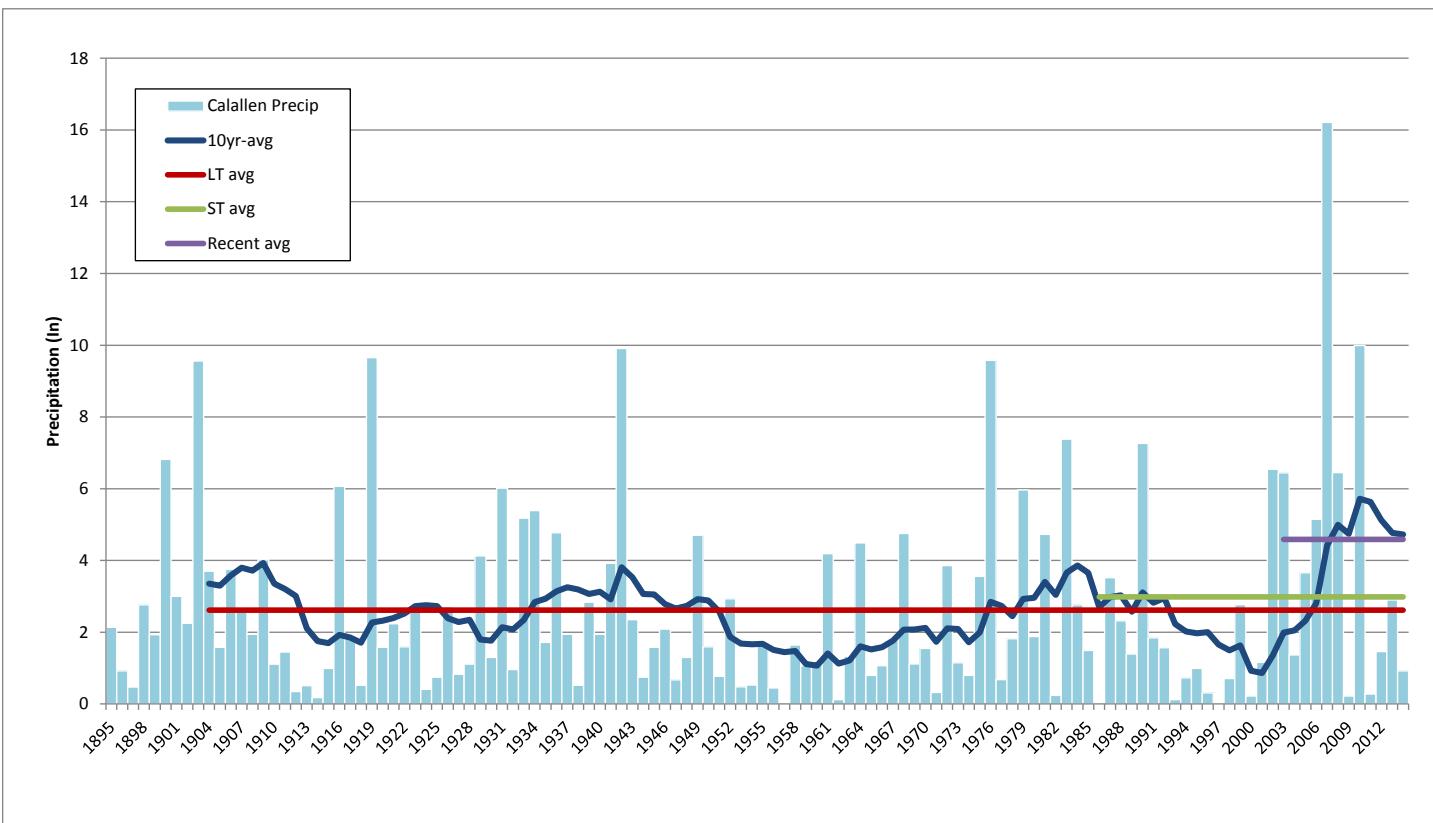
# PRECIPITATION

- July Precip Totals
- 1895 – 2014
- 10-yr moving average



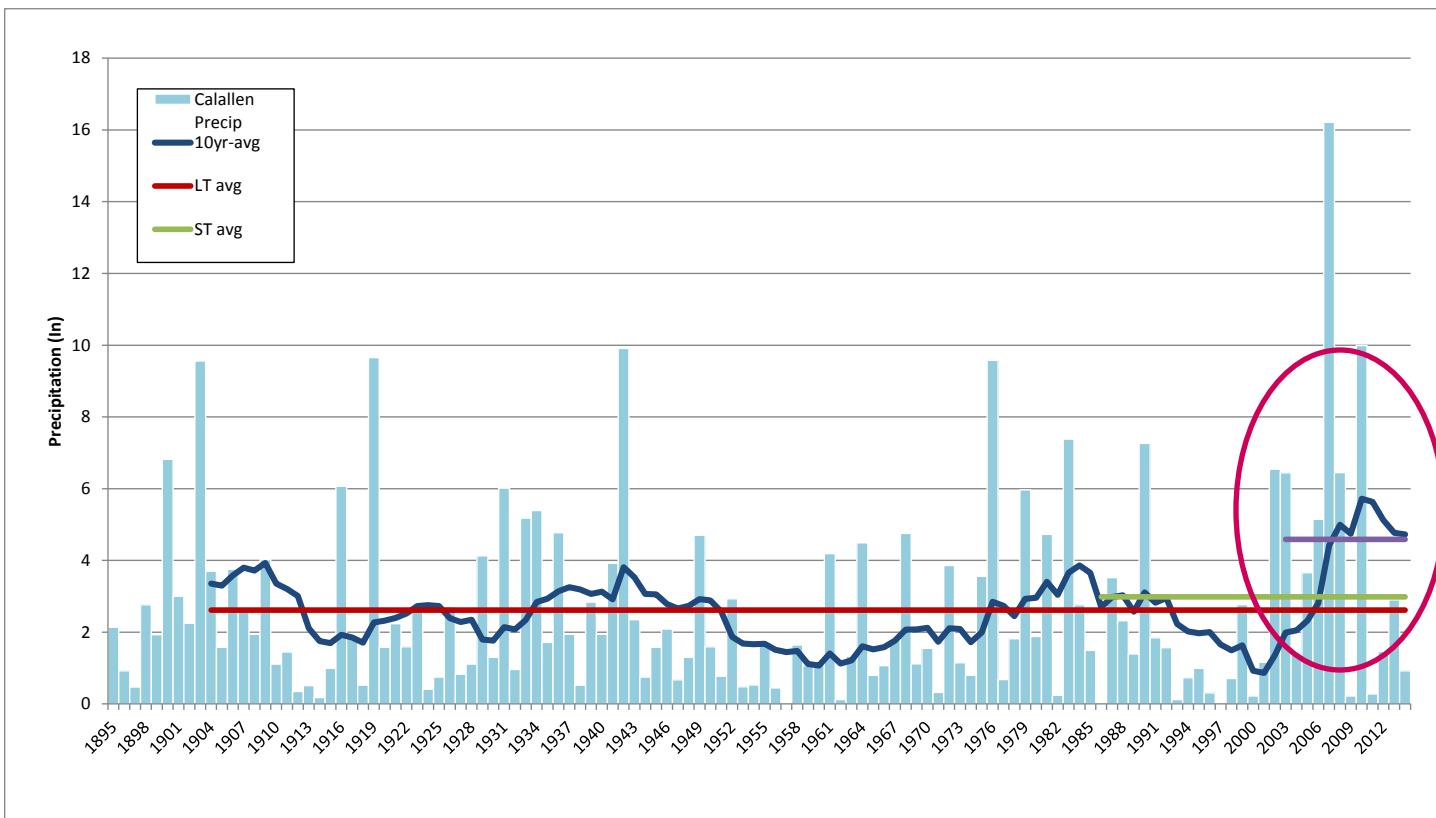
# PRECIPITATION

- July Precip Totals
  - 1895 – 2014
- 10-yr moving average
  - Trends
- Averages
  - Long-Term
  - Short-Term
  - Recent

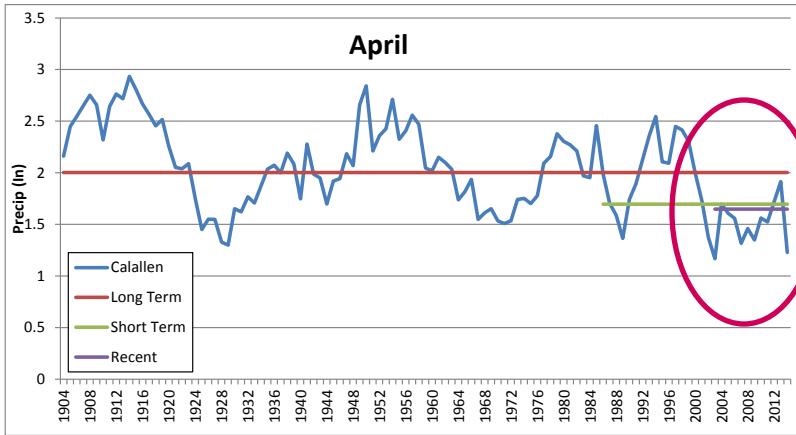
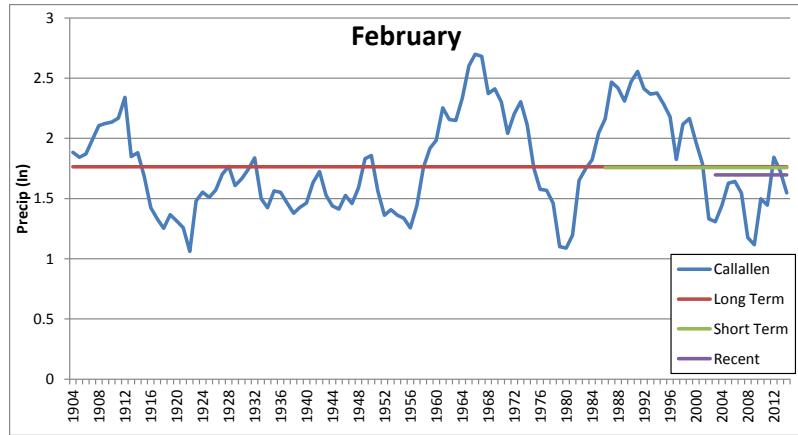
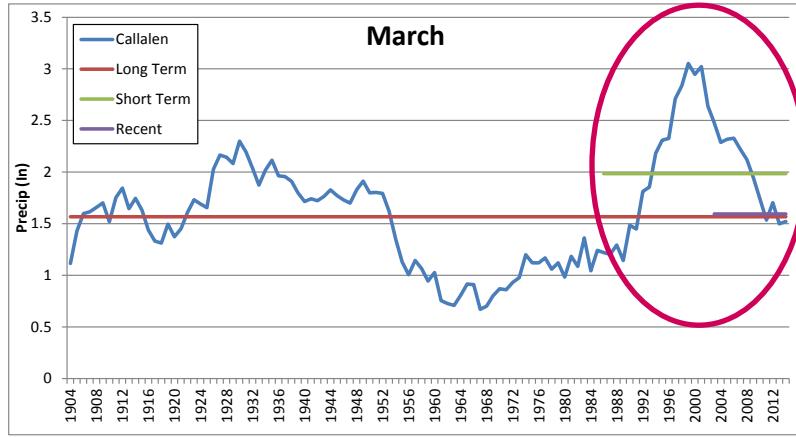
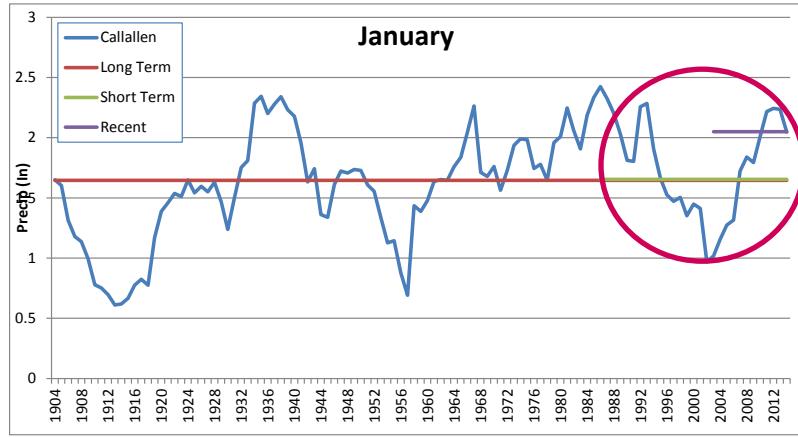


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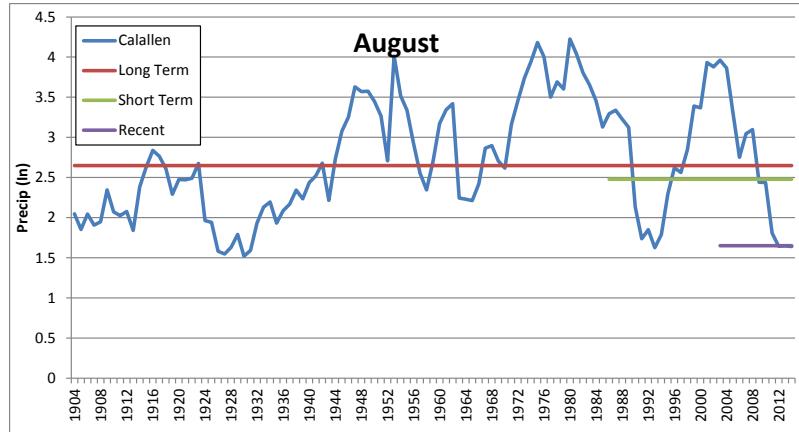
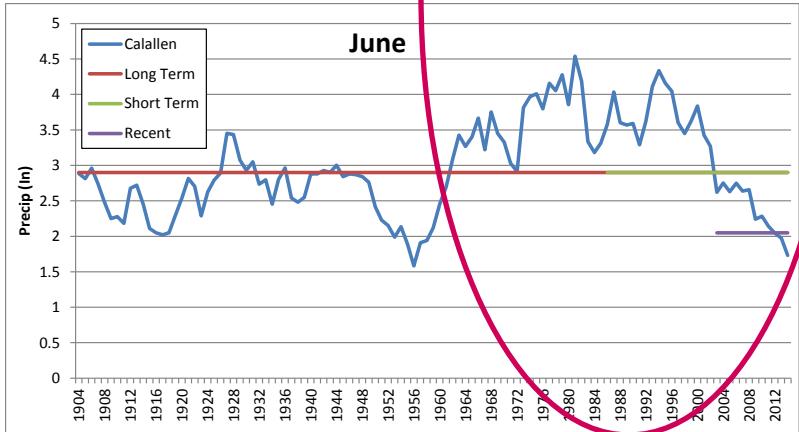
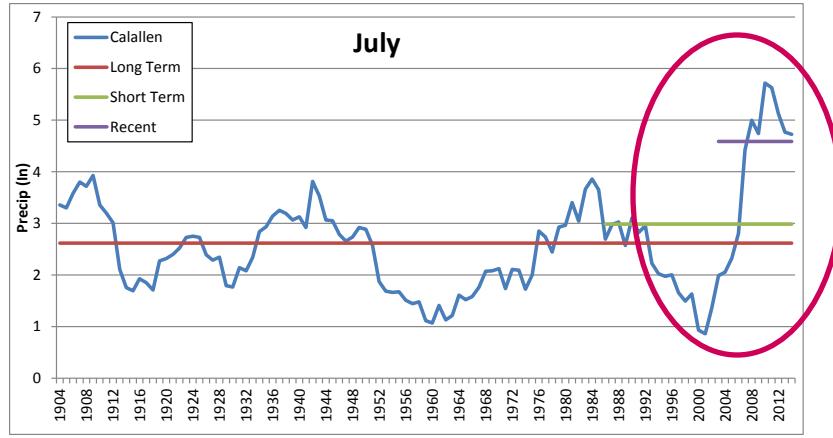
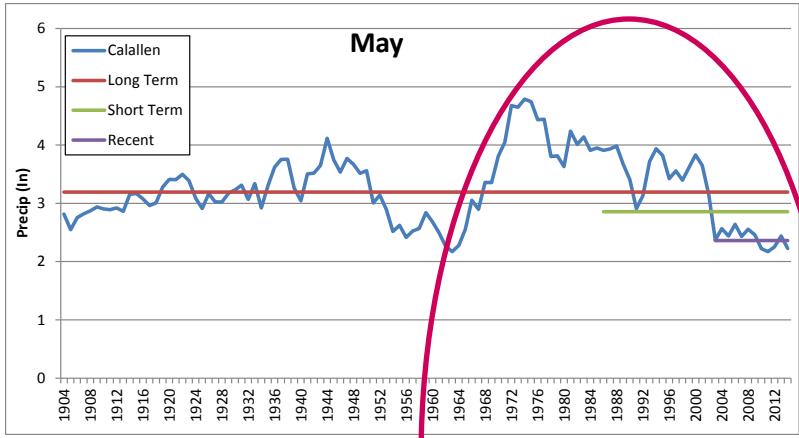
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  - 1895 – 2014
- 10-yr moving average
  - Trends
- Averages
  - Long-Term
  - Short-Term
  - Recent



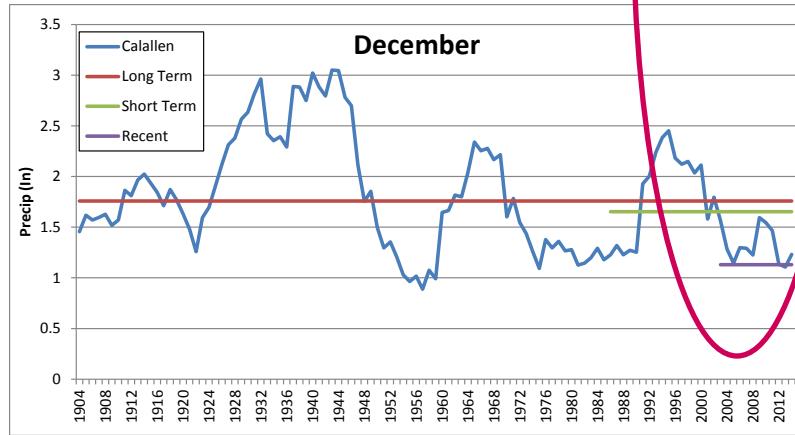
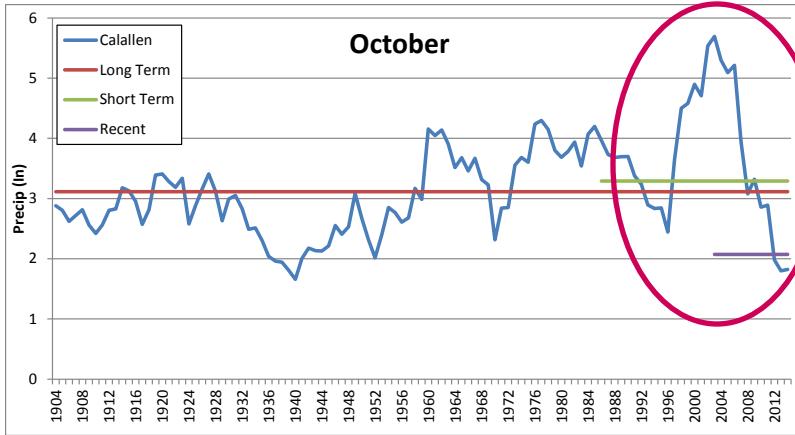
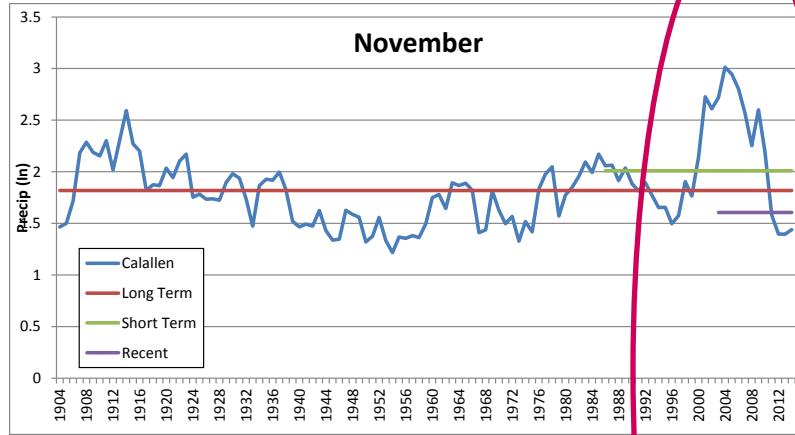
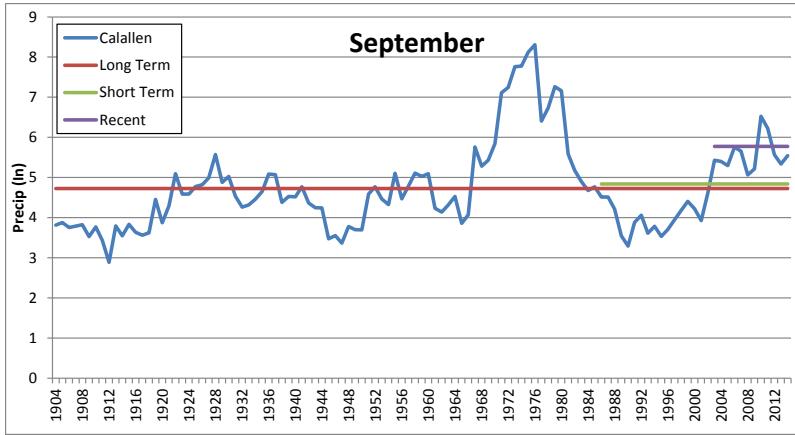
# MONTHLY PRECIPITATION COMPARISONS



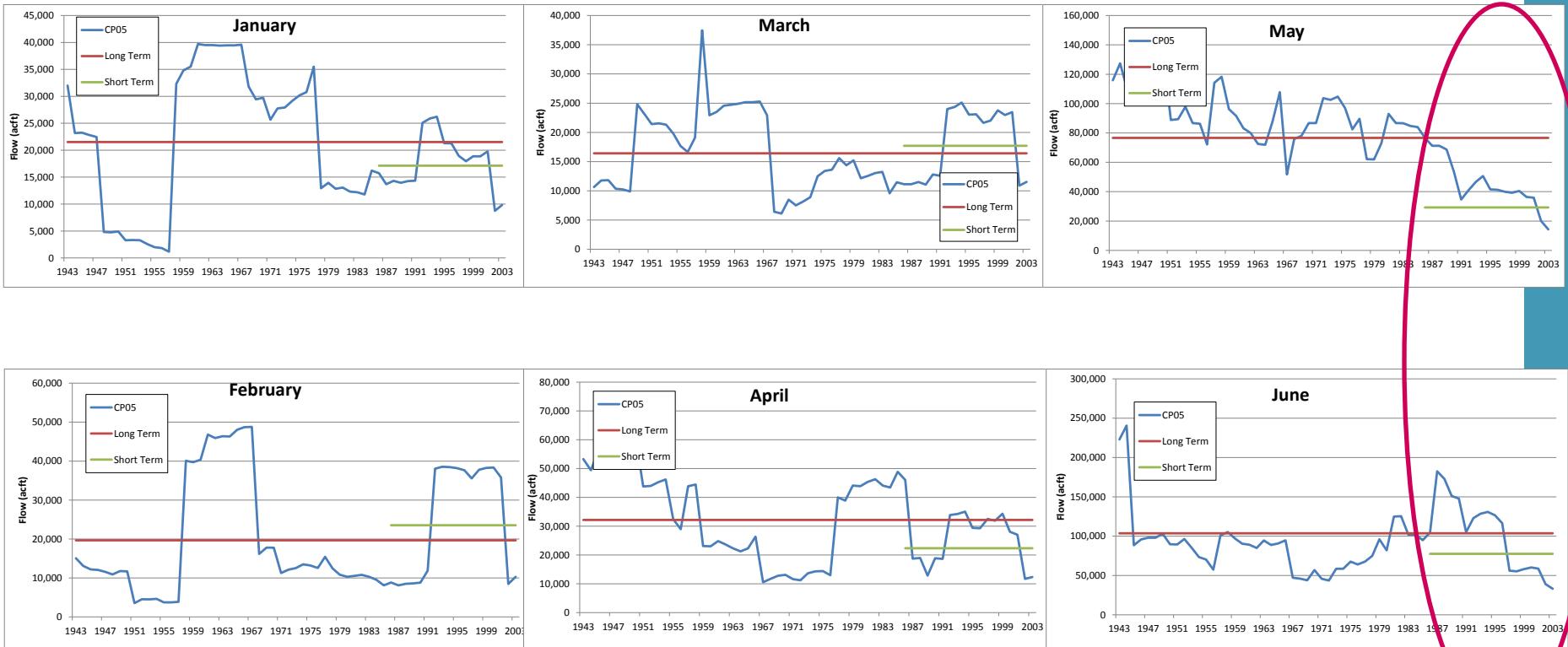
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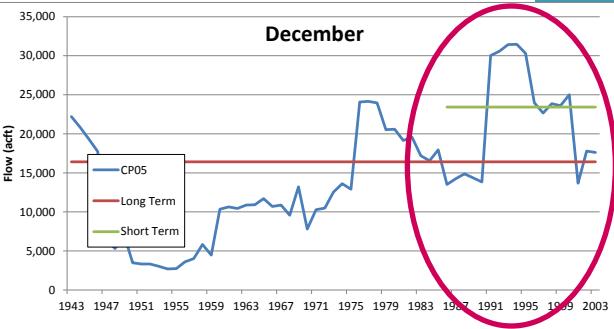
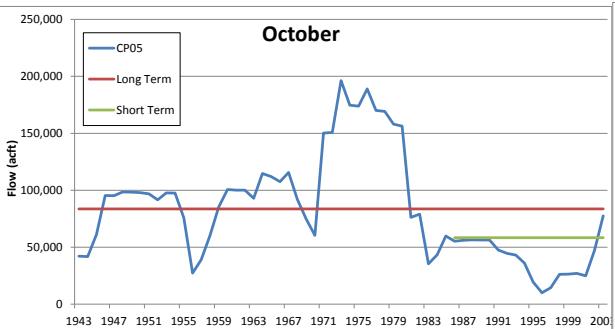
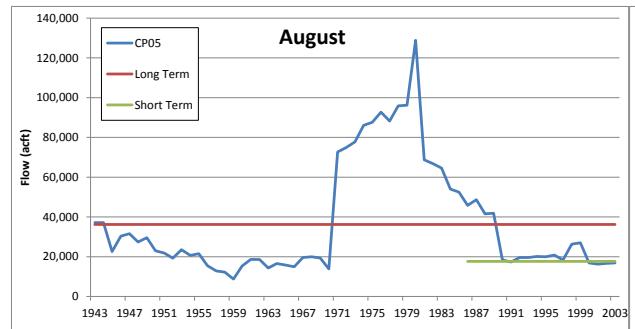
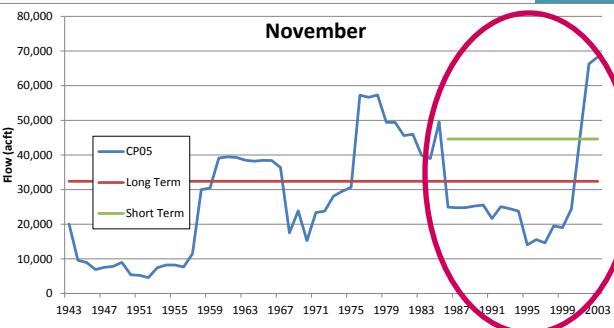
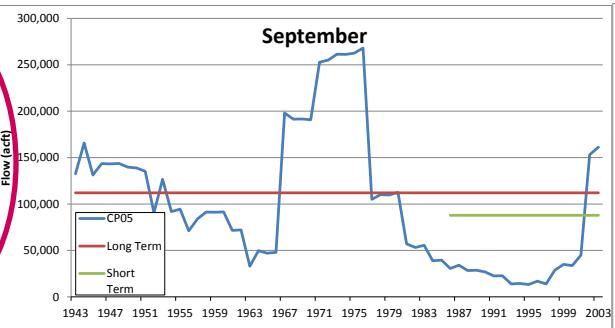
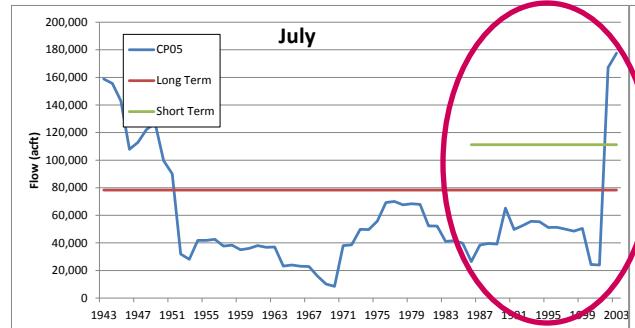
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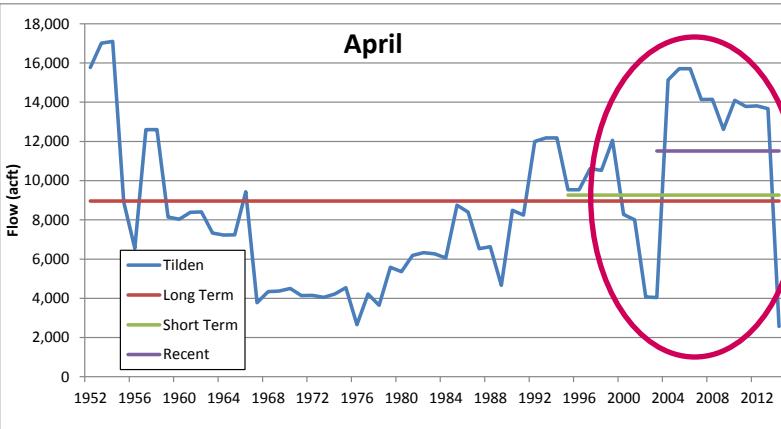
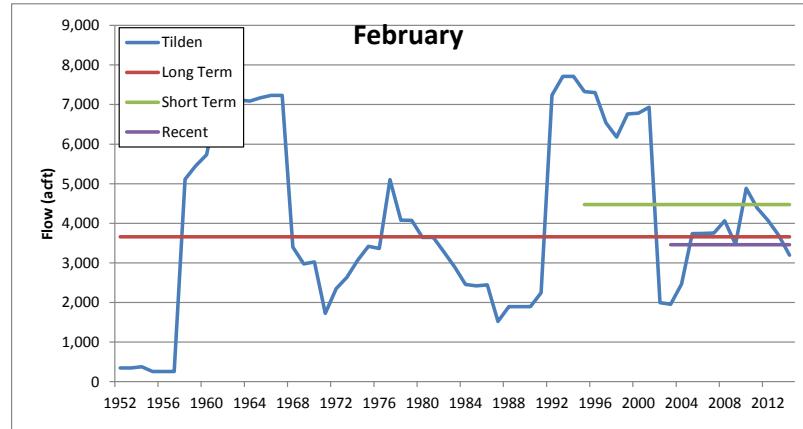
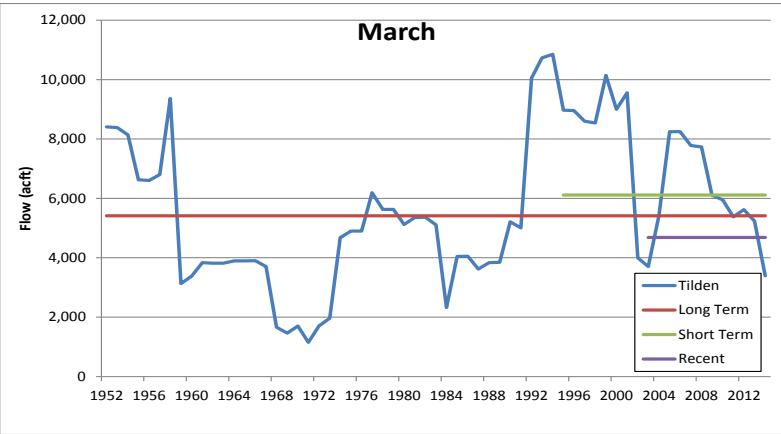
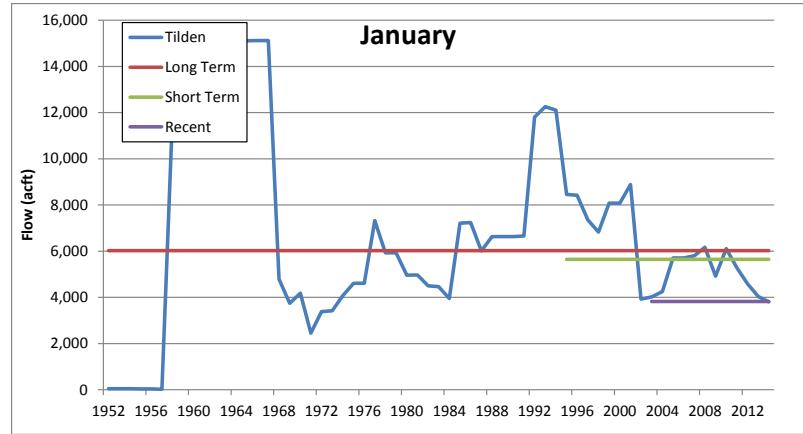
# NATURALIZED FLOW



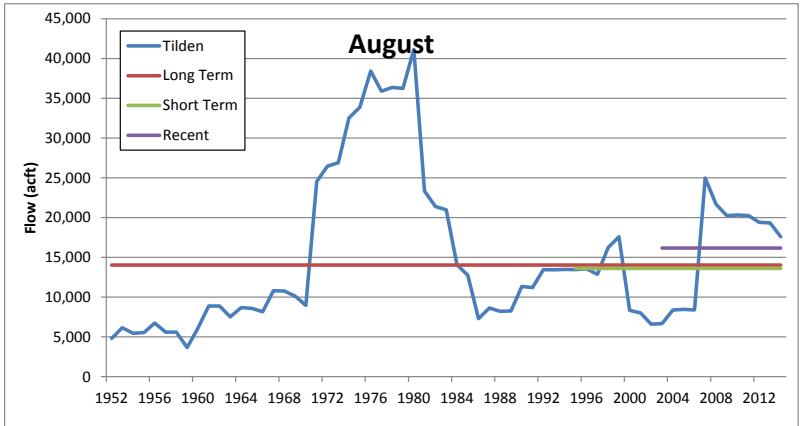
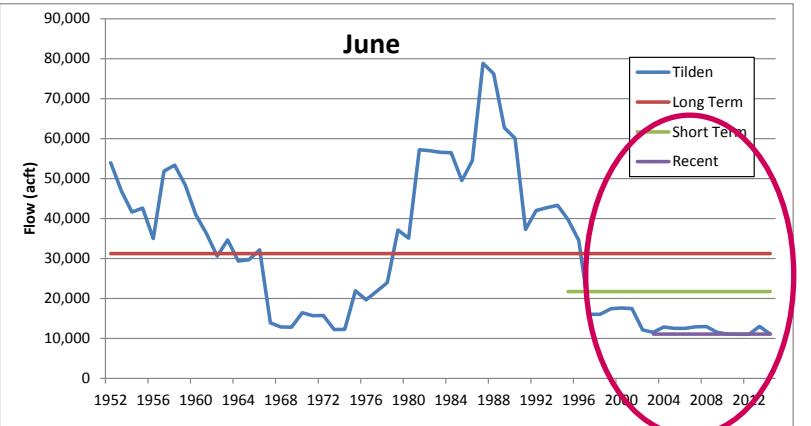
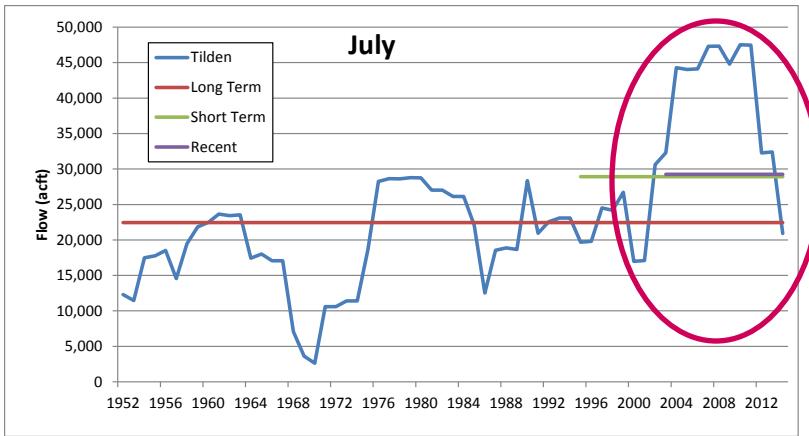
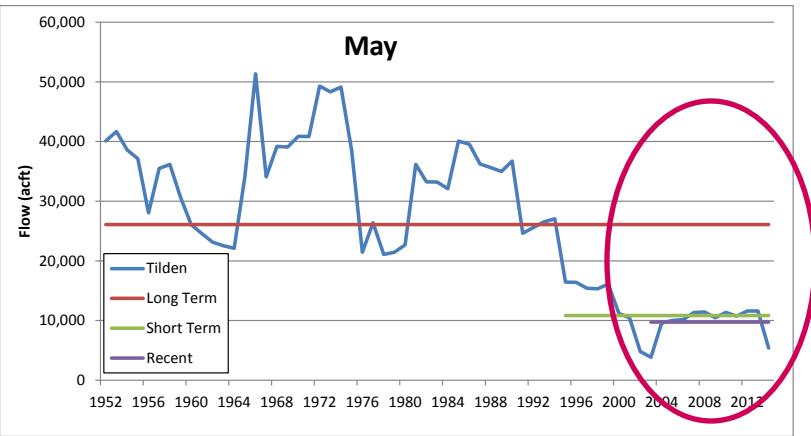
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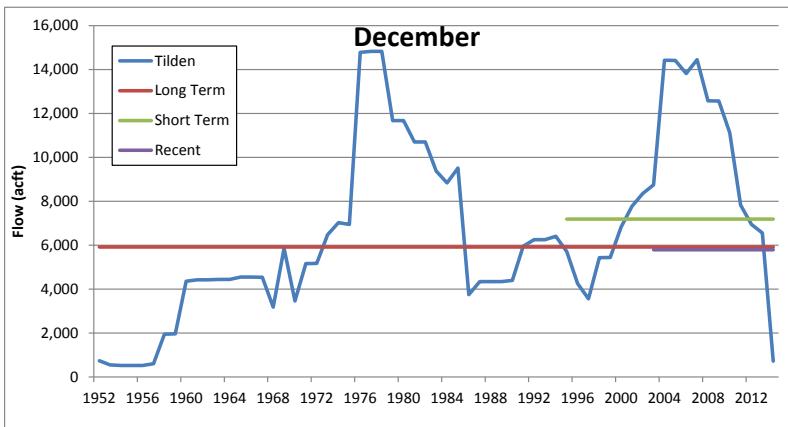
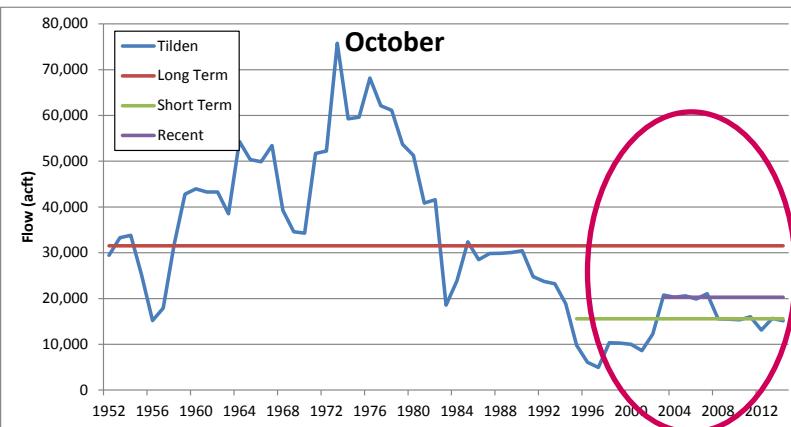
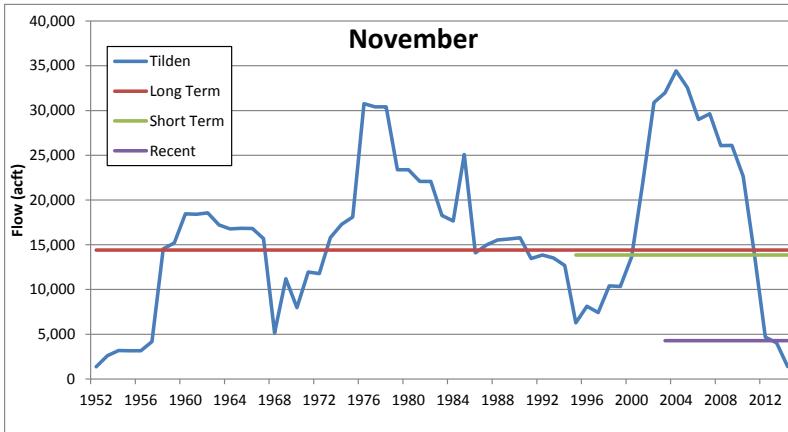
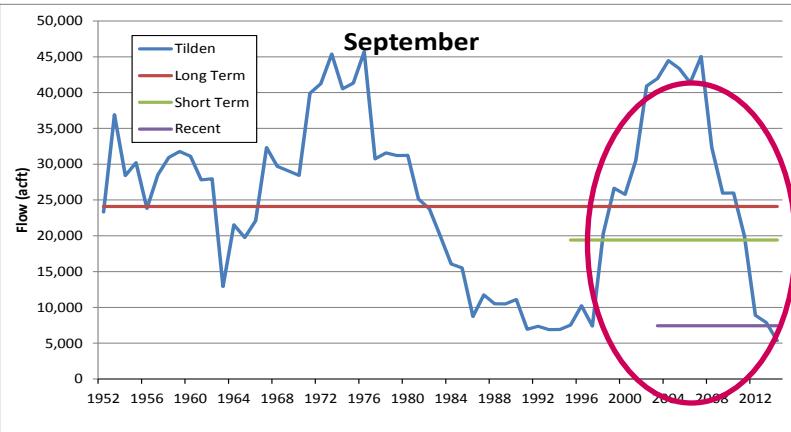
# STREAMFLOW – MONTHLY COMPARISONS



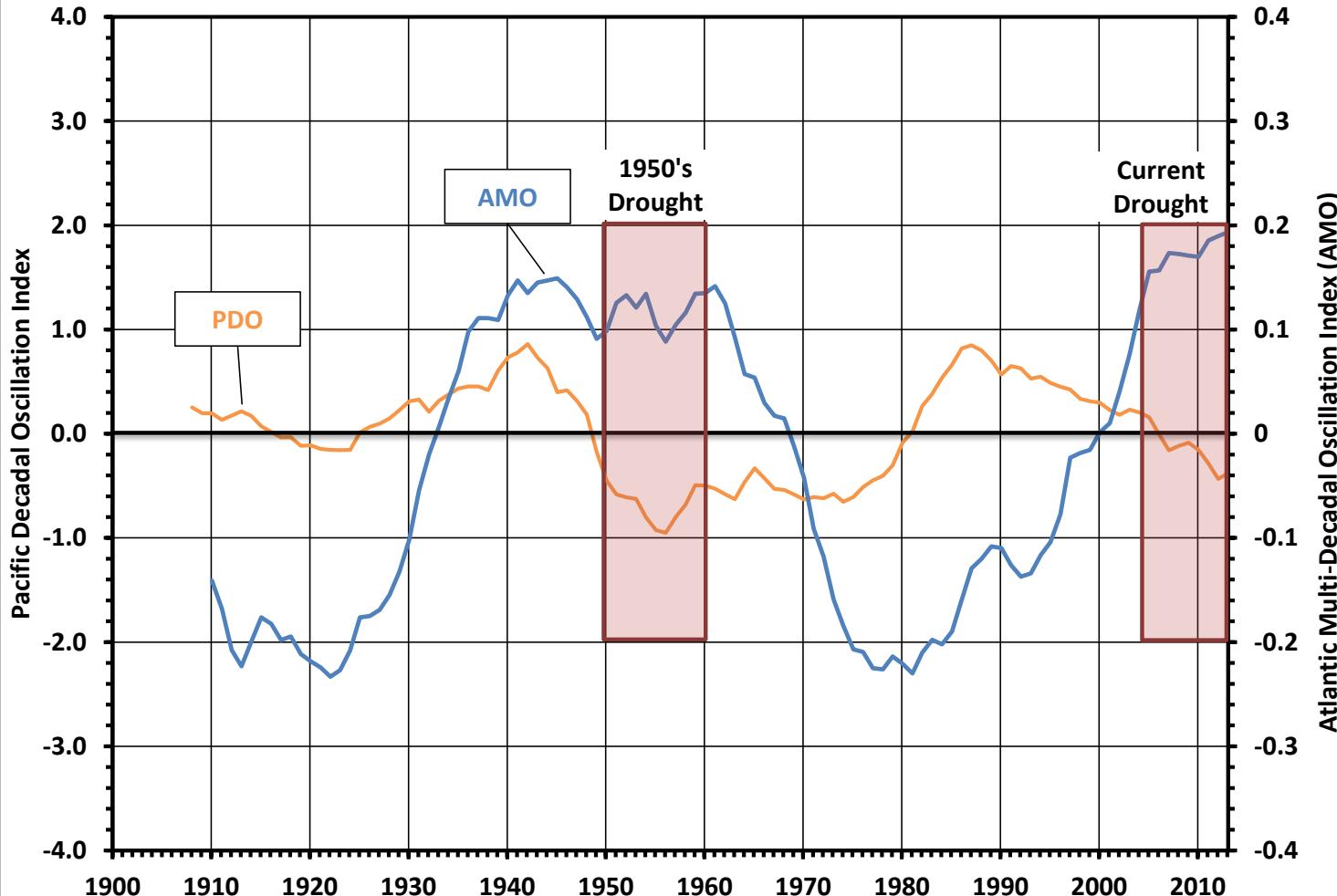
# STREAMFLOW – MONTHLY COMPARISONS



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## 10-Year Moving Average of PDO and AMO



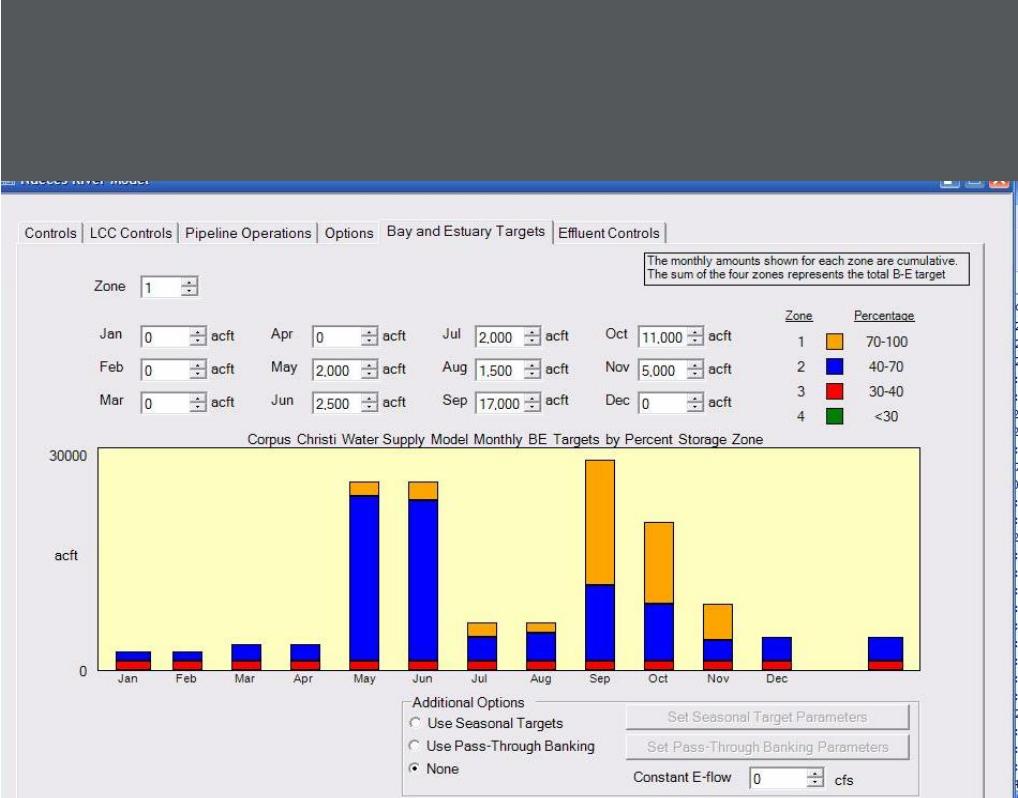
# CONCLUSIONS

	Jan-ST	Jan-R	Feb-ST	Feb-R	Mar-ST	Mar-R	Apr-ST	Apr-R	May-ST	May-R	Jun-ST	Jun-R	Jul-ST	Jul-R	Aug-ST	Aug-R	Sep-ST	Sep-R	Oct-ST	Oct-R	Nov-ST	Nov-R	Dec-ST	Dec-R
Precipitation	↔	↑	↔	↔	↑	↔	↓	↓	↓	↓	↔	↓	↑	↑	↔	↓	↔	↑	↔	↓	↑	↓	↔	↓
Streamflow	↔	↓	↑	↔	↑	↔	↓	↔	↑	↓	↓	↓	↑	↑	↔	↔	↓	↓	↓	↓	↔	↓	↑	↔
QNAT	↓		↑		↑		↓		↓		↓		↑		↓		↓		↓		↑		↑	
Trend	No Change	No Change	No Change		Drier		Drier		Drier		Wetter	No Change		Drier		Drier		Drier		No Change		No Change		

- Six months show no significant trend
  - 4 of these show some minor dry trend in the recent average
- Five months show a drier trend
  - May, June, & Oct being the most significant
- One month shows a wetter trend
  - July is trending wetter in all categories
- The months in the Agreed Order with the highest targets all show drier trends
  - May, June, Sep, Oct

# SEASONAL SHIFT - NEXT STEPS

- If the trend is drier then there is no need to adjust the targets down
- Evaluate impact of the wetter July trend
- CCWSM Simulations
  - Shift target to July
    - Keep overall annual target volume the same
      - » Reduce from May / June
    - Impact to Bay FWI
    - Impact to Safe Yield



## Discussion

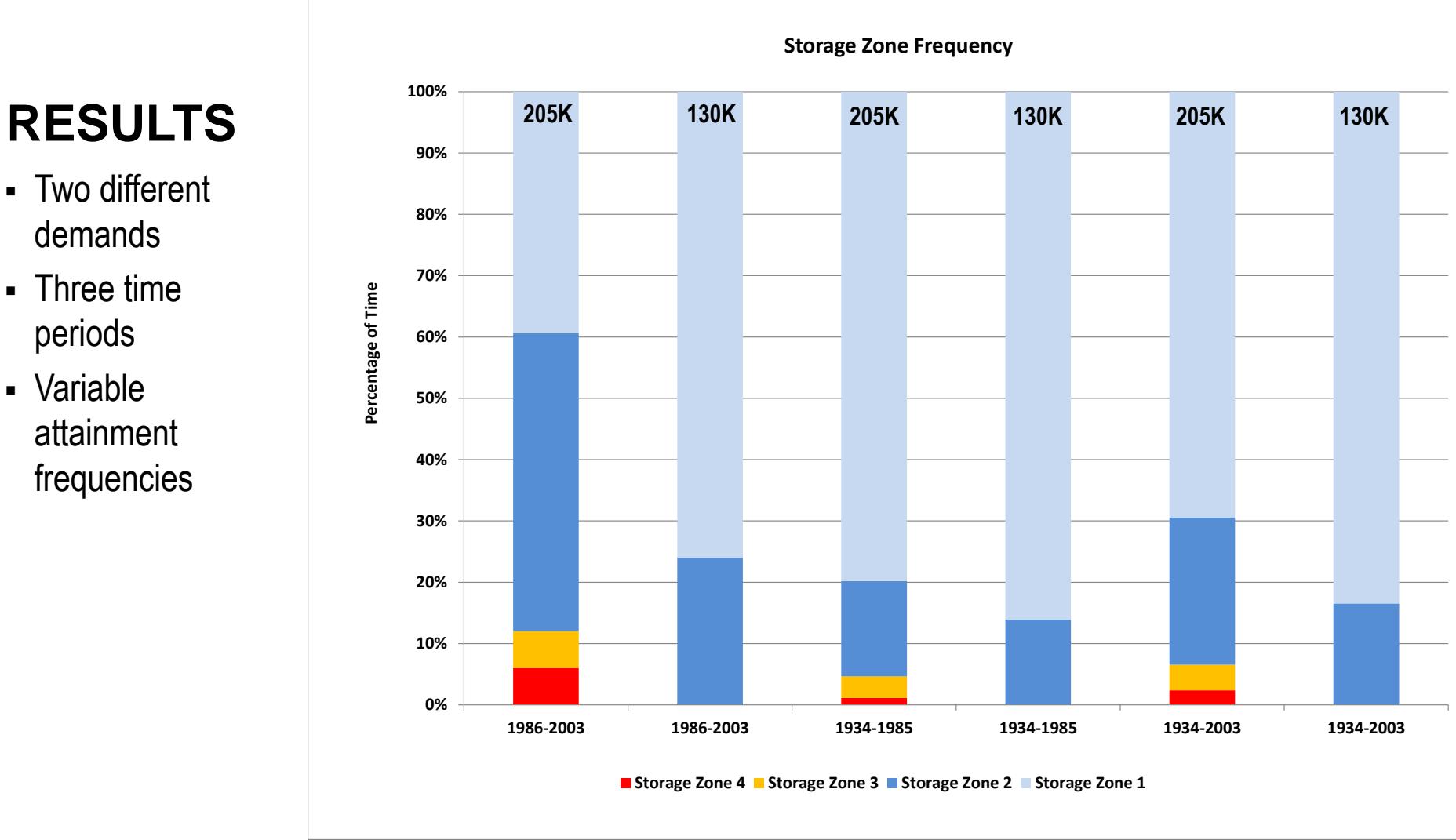
# TASK 2 – YIELD COMPARISON

- Task Complete
- Compare Safe Yield and Current Demand
  - Safe Yield
    - 205,000 acft/yr
      - » 125,000 acft storage reserve (~14%)
      - » Regional Planning modeling assumptions
  - Current Demand
    - 133,000 acft/yr
  - Results
    - Lake Level Comparison
    - FWI Comparison
    - Attainment Frequency
    - Mass Balance



# RESULTS

- Two different demands
- Three time periods
- Variable attainment frequencies

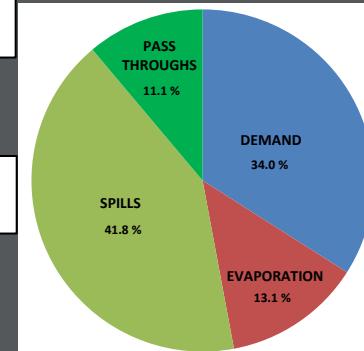


# MASS BALANCE

- Spills are significant
- Long-term
  - Evaporation 0.6% Difference
  - Pass-Throughs 0.1% difference
  - Demand and Spills are the rest
- Short-term
  - Evaporation 2.2% Difference
  - Pass-Throughs 2.7% Difference

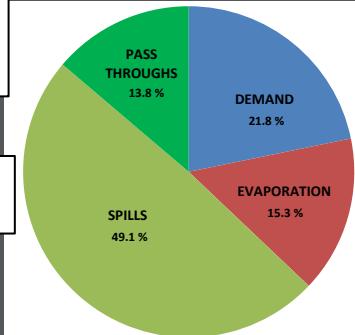
Safe Yield

1986-2003

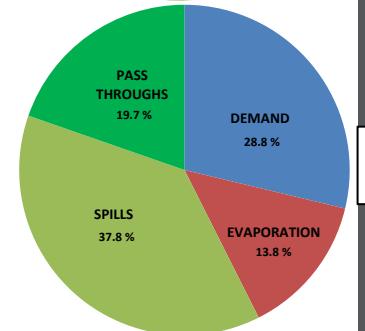


Current Demand

1986-2003

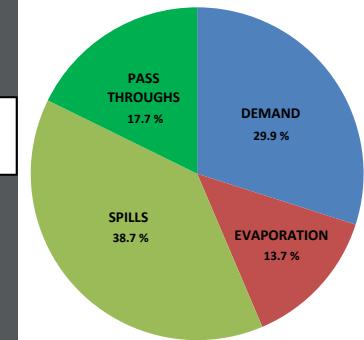


1934-1985

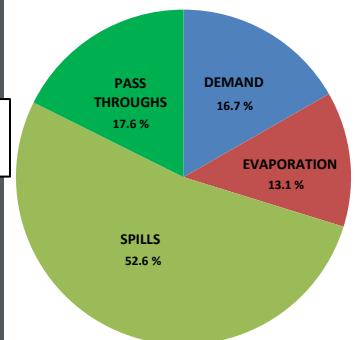


1934-1985

1934-2003



1934-2003



## TASK 2 – FINDINGS

- Lower demand = higher lake levels = more opportunity for larger pass-throughs
  - On the long-term average: differences small
- Drought times are dominated by lack of inflows
  - During droughts the differences are increased but still small



# **TASK 3 – MEETINGS AND REPORT**

- Task 3 – Meetings and Report
  - Kickoff Meeting (June 2014)
  - Results Meeting #1 (Oct 2014)
  - Results Meeting #2 (Feb 2015)
  - Draft and Final Report (Summer 2015)



# **SCHEDULE**

- Complete Analysis in March 2015
- Draft report June 2015
- Final report due August 2015



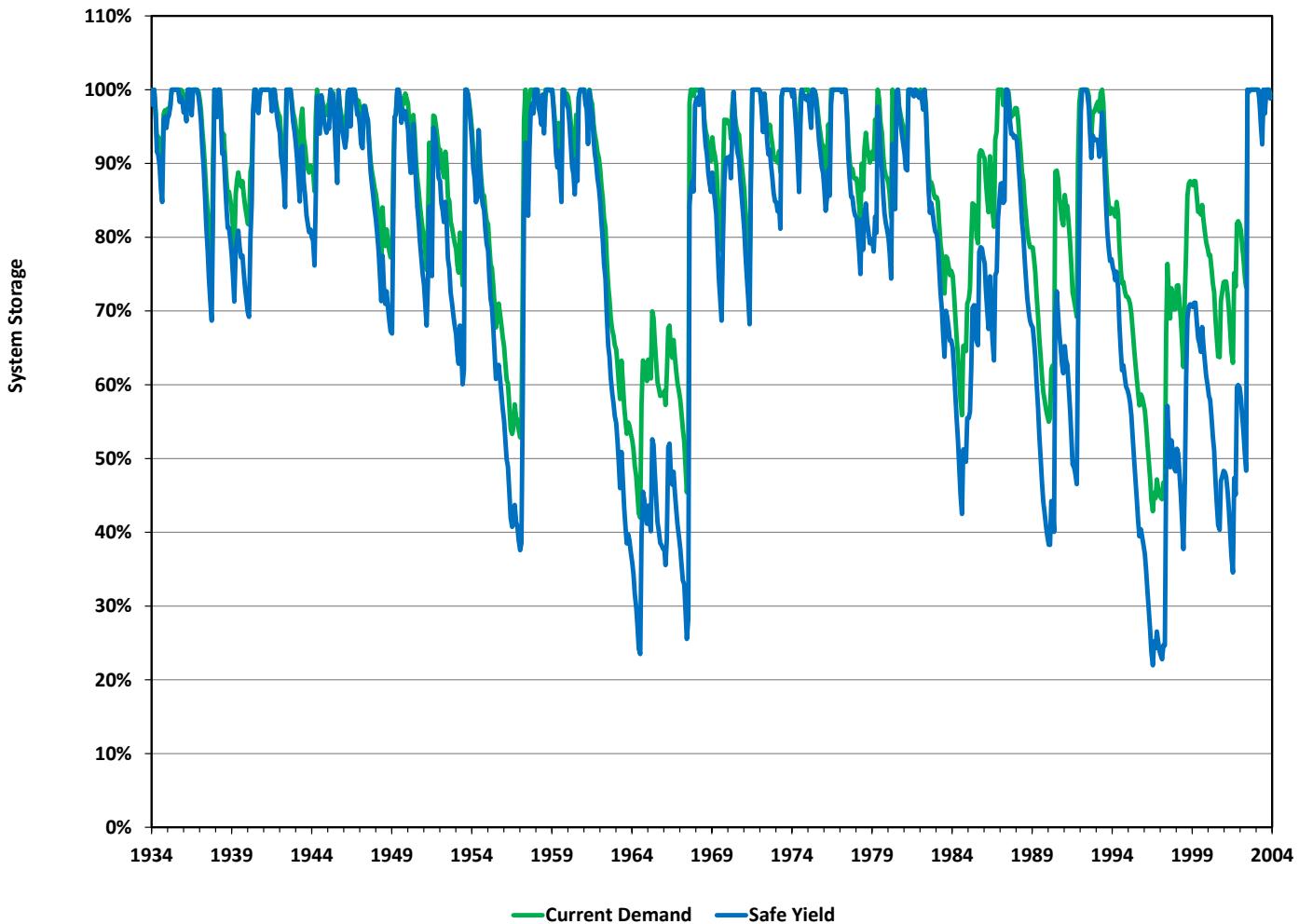
# RINCON BAYOU

*CBBEP Nueces Delta Preserve*





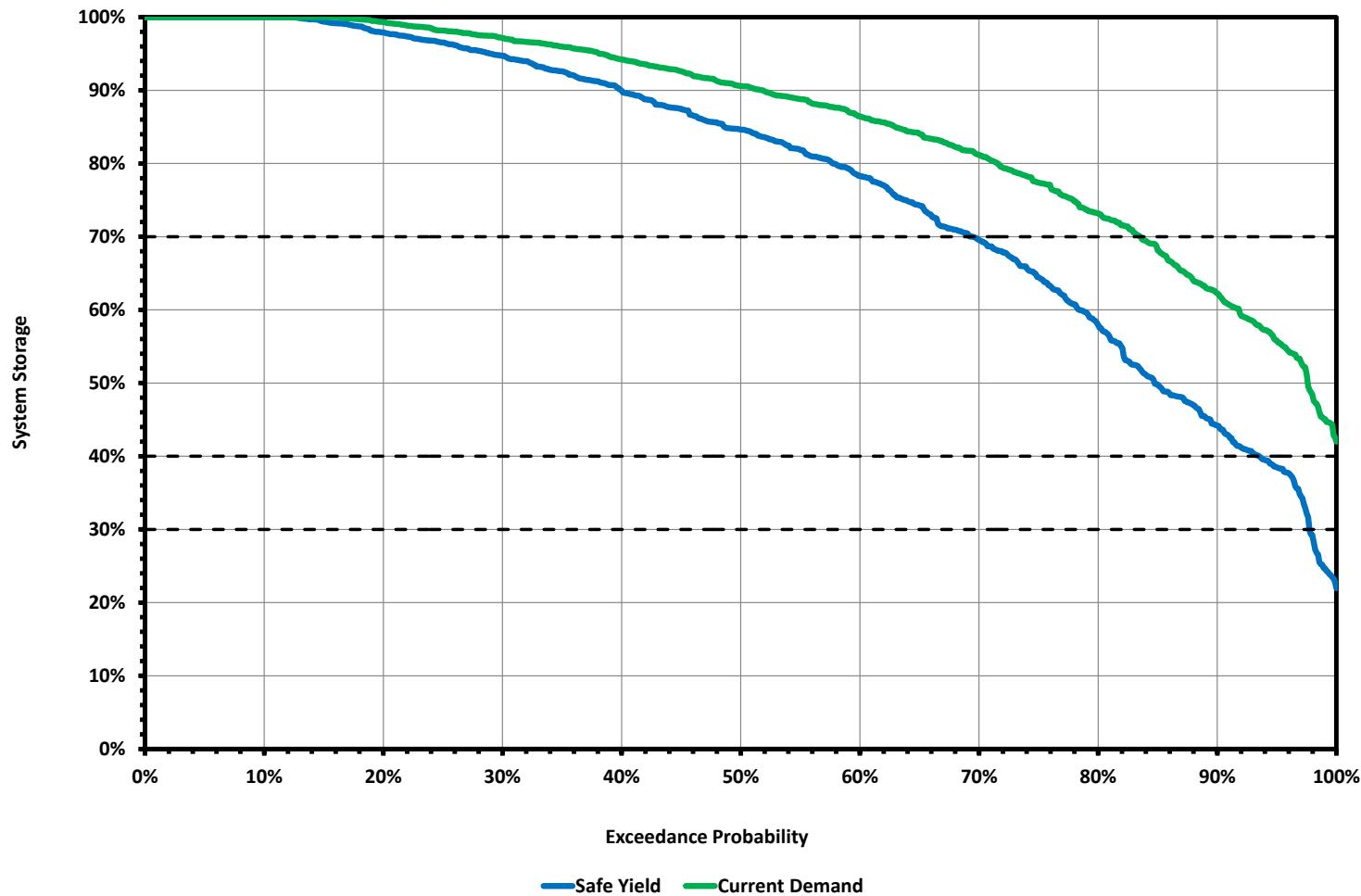
## Simulated Storage Time Series



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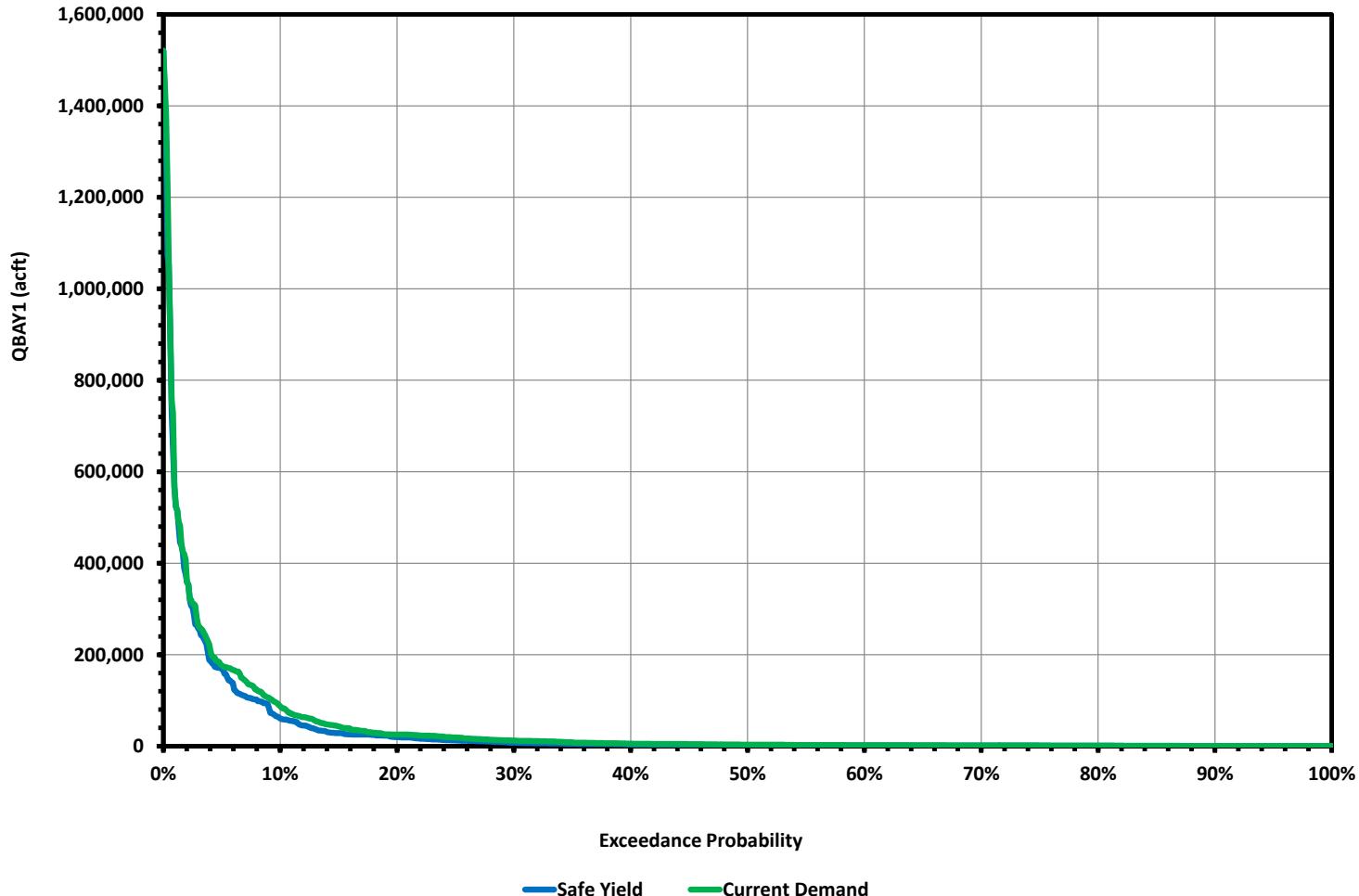


**LCC/CCR System**  
**Monthly Storage Frequency for Selected Scenarios**



Scenario	Time Period	Target Attainment (% of time)	Target Attainment (% of target volume)
Safe Yield	1986-2003	25.9%	81.5%
Current Demand		25.5%	80.0%
Safe Yield	1934-1985	28.5%	148.2%
Current Demand		34.8%	156.3%
Safe Yield	1934-2003	27.9%	132.8%
Current Demand		32.4%	136.7%

**LCC/CCR System**  
**Monthly Flow Frequency for Selected Scenarios**



**LCC/CCR System**  
**Monthly Flow Frequency for Selected Scenarios**

